DOCUMENT RESUME

ED 098 077 SE 018 423

TITLE	State Agency R&D Activities Almost Quadrupled From FY 1964 to FY 1973. Science Resources Studies Highlights. September 3, 1974.
INSTITUTION	National Science Foundation, Washington, D.C. Div. of Science Resources Studies.
REPORT NO	NSF-74-311
PUB DATE	3 Sep 74
NOTE	4p.
EDRS PRICE	MF-$0.75 HC-$1.50 PLUS POSTAGE
DESCRIPTORS	Educational Resources; Federal Aid; *Financial Support; *Manpower Development; Reports; *Research; Sciences; Scientific Manpower; *State Agencies; *State Federal Aid

ABSTRACT

This bulletin presents data from a survey covering research and development (R&D) expenditures of state government agencies (exclusive of state universities and colleges) for 1973. Charts showing expenditures, by source of funds of selected years and share of character-of-work components in state agency R&D activities, are shown in the report. Tables showing state agency expenditures for R&D, by state and functional area for fiscal year 1973 as well as for other selected years, are shown; tables also present R&D expenditures by field of science. The states that account for a major share of total state agency R&D and R&D plant expenditures include Illinois, Florida, Texas, Washington, Pennsylvania, Virginia, Michigan and Ohio. The survey also included data on the scientific manpower engaged in the intramural performance of state agency R&D efforts. (EB)

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nsf SCIENCE RESOURCES STUDIES HIGHLIGHTS

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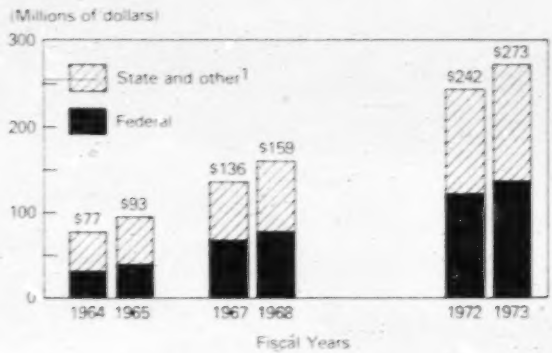
State Agency R&D Activities Almost Quadrupled From FY 1964 to FY 1973

A total of $242 million in fiscal year 1972 and $273 million in fiscal year 1973 was expended by State government agencies for research, development, and R&D plant, according to a recently completed NSF survey.[1] The Federal Government provided approximately 50 percent of these funds in 1972 and 1973, and the State governments provided about 48 percent in both years, with the balance provided by nongovernment sources.

The expenditures reported in 1973 represent an almost fourfold increase over the $77 million reported in 1964,[2] and even in constant dollars, the rise is almost threefold. In the midsixties the Federal Government contributed less proportionately to the State R&D expenditures than later on when Federal matching grant programs reached their peak. (See chart 1.)

In 1973, nearly nine-tenths of Federal support for State R&D programs was provided by six agencies: The Office of Education of the Department of Health, Education, and Welfare (HEW), 23 percent; the National Institutes of Health (HEW), 16 percent; the Federal Highway Administration of the Department of Transportation, 14 percent; the Bureau of Sport Fisheries and Wildlife of the Department of the Interior, 12 percent; the National Institute of Mental Health (HEW), 11 percent; and the Social and Rehabilitation Service (HEW), 10 percent.

Chart 1. State Government agency R&D and R&D plant expenditures, by source of funds: selected years



[1] "Other" includes about 2 percent of the total each year, and is received from nongovernment sources.

SOURCE: National Science Foundation

Support by Functions

Throughout the 1964-73 period, more than one-half of total State government agency R&D funds was expended in two functional areas: health and natural resources (table 1). In 1973 R&D programs related to health accounted for 35 percent of the total for all States, compared with 37 percent in 1964. The natural resources share during the same period dropped from 30 percent of the total to 22 percent. The transportation and communications share also dropped substantially, from 18 percent in 1964 to 12 percent in 1973. On the other hand, support for R&D programs related to education rose from 2 percent of the State R&D total to 15 percent. Environment increased from 1 percent to 5 percent, and income security and social services from 5 percent to 8 percent. Whatever may have been occurring relatively, funding in all of these functional areas rose substantially in absolute terms between 1964 and 1973.

Five functions—crime prevention and control, economic growth and productivity, area and community development and housing, science and technology, and energy development and conversion—together accounted for 4 percent of all State agency R&D expenditures in 1973, compared with 7 percent in 1964.

Total R&D expenditures in the United States amounted to $30.6 billion in 1973. Of that total, $1.8 billion represented expenditures for research and development by State universities and colleges, exclusive of the $273 million expended for research and development and R&D plant by State government agencies. Thus, expenditures at the State level represented approximately 7 percent of national R&D expenditures.

[2] The present survey is the third covering R&D expenditures of State government agencies (exclusive of State universities and colleges). The earlier NSF surveys covered fiscal years 1964, 1965, 1967, and 1968.

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Table 1. State agency expenditures for research and development,[1] by State and functional area: fiscal year 1973

(Dollars in thousands)

State	Total	Health	Natural resources	Education	Transportation and communications	Income security & social welfare	Environment	Crime prevention & control	Economic growth & productivity	All other
U.S. total	$[illegible]	$[illegible]	$[illegible]	$[illegible]	$[illegible]	$[illegible]	$[illegible]	$[illegible]	$[illegible]	$[illegible]
Alabama	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Alaska	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Arizona	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Arkansas	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
California	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
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Connecticut	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Delaware	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Florida	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
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Minnesota	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
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Montana	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Nebraska	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
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New Mexico	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
New York	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
North Carolina	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
North Dakota	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Ohio	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Oklahoma	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
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South Carolina	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
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Virginia	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Washington	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
West Virginia	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Wisconsin	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Wyoming	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

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Source: National Science Foundation.

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Leading States

A few States account for a major share of total State agency R&D and R&D plant expenditures, and two States, New York and California, accounted for more than one-third of the total in 1973 (New York, 24 percent and California, 13 percent). Together the 10 largest States (in terms of R&D expenditures) accounted for two-thirds of the total in 1973. Besides New York and California these States, in descending order of dollar support, are Illinois, Florida, Texas, Washington, Pennsylvania, Virginia, Michigan and Ohio. Most of these States are characterized by concentrations of population, considerable Federal agency program activity, and government interest in the utilization of science resources.

Fields of Science

In 1973 the life sciences (biological and clinical medical) accounted for 46 percent of total State R&D expenditures, compared to 59 percent in 1964 (table 2). Engineering also reflected a decreased share of the R&D total over the 9-year period—from 19 percent to 12 percent. Conversely, the social sciences increased from 13 percent to 26 percent, psychology from 4 percent to 7 percent, and environmental sciences from 3 percent to 5 percent. All fields show absolute dollar increases, but the declining share of the life sciences reflects the increase of other functional areas relative to health and natural resources. The increasing share of the social sciences is related to the growth of education R&D programs.

Table 2. State agency R&D expenditures by field of science: selected years

[Dollars in thousands]

Field of science	1964	1965	1967	1968	1972	1973
Total all fields	$72,002	$87,896	$131,187	$157,724	$244,923	$263,778
Agriculture	24,311	27,693	34,290	36,030	75,134	83,280
Clinical medical	18,216	22,130	26,071	30,590	35,957	38,123
Psychology	2,794	4,136	7,125	10,189	16,022	18,655
Physical sciences	662	1,218	2,774	3,964	5,896	7,065
Environmental sciences	2,453	2,808	8,771	11,648	11,021	13,851
Mathematics	85	256	475	1,066	1,603	1,860
Engineering	13,580	14,997	20,468	22,653	29,143	30,456
Social sciences	9,141	12,658	24,379	29,451	58,098	67,145
Other sciences	720	1,000	1,234	847	2,439	3,341

Source: National Science Foundation

Character of Work

Throughout the 9-year period major emphasis has been placed on applied research. (See chart 2 and table 3.) The applied share of the R&D total has risen from 46 percent in 1964 to 62 percent in 1973. This emphasis reflects the problem-oriented approach of most State agencies, whose R&D programs are related to their operational missions, e.g., health, recreation, highways, natural resources, etc. The share of the State agency R&D total directed to basic research has dropped considerably over the 9-year period—from 35 percent in 1964 to 22 percent in 1973. The development share has fluctuated between a high of 27 percent in 1968 to a low of 16 percent in 1973.

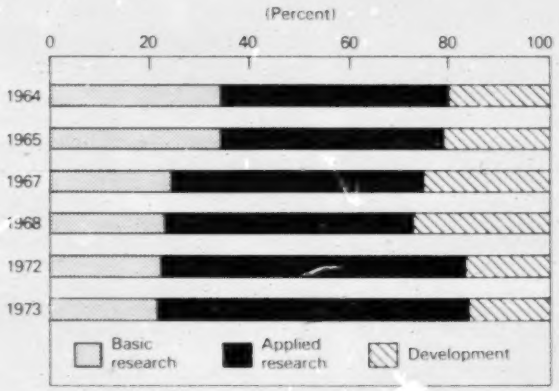
Table 3. State agency R&D and R&D plant expenditures: selected years

[Dollars in thousands]

Type of expenditure	1964	1965	1967	1968	1972	1973
Total R&D and R&D plant	$77,352	$93,296	$136,249	$169,214	$249,099	$272,371
Research and development	72,002	87,896	131,187	154,724	244,923	263,778
Basic research	24,855	30,351	32,302	35,552	52,601	57,626
Applied research	32,848	39,364	65,268	76,683	140,504	163,375
Development	14,299	18,471	33,617	42,489	39,799	42,776
R&D plant	5,350	5,400	5,112	4,490	7,176	8,593

Source: National Science Foundation

Chart 2. Share of character-of-work components in State agency R&D activities



SOURCE: National Science Foundation

Performers

The State government agencies continue to perform the largest share of their work themselves, approximately two-thirds of the total in 1973, or $175 million. The remainder has been contracted out to other performers such as private industry, universities, multigovernmental agencies (interstate or regional authorities), and nonprofit institutions.

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Manpower

The survey also developed data on the scientific manpower engaged in the intramural performance of State agency R&D efforts (table 4). A full-time equivalent of 4,899 scientists and engineers, 3,093 technicians, and 3,307 other personnel—such as typists and administrative personnel—were involved in the R&D work performed intramurally in 1973. While their numbers have increased steadily over the years, the R&D-performing personnel have increased less rapidly than intramural R&D expenditures. The cost per scientist/engineer in 1964 was $21,000 compared with almost $36,000 in 1973. This rise in part reflects inflation and in part the growing complexity of R&D programs.

* * * * *

Further details from the State government agencies survey will be published in the *Research and Development in State Government Agencies, Fiscal Years 1972 and 1973*, available later this year from the Superintendent of Documents, U.S. Government Printing Office.

Table 4. Personnel engaged in State agency intramural R&D activities, by type: selected years

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BETHESDA MD 20014